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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/712,326	11/12/2003	Rao Annapragada	LAM-P-1031	2008

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Michael A. Kerr  
Virtual Legal  
Suite 211  
777 E. William St.  
Carson City, NV 89701

EXAMINER

NGUYEN, THANH T

ART UNIT PAPER NUMBER

2813

DATE MAILED: 05/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/712,326	ANNAPRAGADA ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Thanh T. Nguyen	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 15 February 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant's arguments filed 2/15/05 have been fully considered but they are not persuasive.

### ***Specification***

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-19 are stand rejected under 35 U.S.C. 102(e) as being anticipated by Chooi et al. (U.S. Patent No. 6,465,888) as previously applied.

Referring to figures 2a-4f, Han et al. teaches a method of removing a photoresist layer (see col. 7, lines 59-60) from an integrated circuit (IC) structure having an etched dielectric layer with an exposed barrier layer, wherein the dielectric layer comprises silicon and oxygen (230, see col. 7, lines 47-54) and the barrier layer comprises silicon nitride or silicon carbide (215, see col. 7, lines 20-33), the method comprising:

Firstly, etching the dielectric layer (230) and exposing the barrier layer (215, see figure 2b);

Secondly, feeding a first gas mixture into a reactor wherein the first gas mixture comprises carbon monoxide (CO)(see col. 8, lines 1-10);

Generating a plasma in the reactor (see col. 8, lines 1-10, noted that gas have to flow in the chamber and plasmanizing); and

Selectively removing the photoresist layer with little or no etching of the exposed barrier layer (see figure 2b, col. 8, lines 11-16), thereby minimizing the loss of the exposed barrier material during removing the photoresist layer. Noted that since removing the photoresist by ashing without removing anything inside of the opening would minimize the loss of the barrier material.

Regarding to claim 2, dielectric material is silicon dioxide (230, see col. 7, lines 47-54).

Regarding to claim 3, the first gas mixture further comprises oxygen (O<sub>2</sub>) (see col. 8, lines 1-10).

Regarding to claim 4, the first gas mixture further comprises nitrogen (N<sub>2</sub>) (see col. 8, lines 1-10).

Regarding to claims 5, 11, 15, the first gas mixture further comprise the gas mixture selected from the group consisting of oxygen, nitrogen, nitrogen/oxygen, nitrous oxide, ammonia, nitrogen/hydrogen, and water vapor (see col. 8, lines 1-10).

Regarding to claims 6, 12, 17, etched dielectric material is composed of a material selected from the group consisting of silicon dioxide, silicon oxide, organosilicate glass, and fluorinate silicate glass (see col. 7, lines 34-54).

Regarding to claims 7, 13, 18, cap layer located between the dielectric and the photoresist, the cap layer is composed of a material selected from the group consisting of silicon dioxide, silicon oxynitride, silicon carbide and silicon nitride (235, silicon nitride, see col. 7, lines 54-58).

Regarding to claims 8, 14, reactor used to remove the photoresist from the IC structure is also used to etch the dielectric (see col. 8, lines 1-16).

Regarding to claim 9, a third layer that includes a conductive interconnect (210) that abuts the barrier layer (215) and the second dielectric material (220) adjacent the conductive interconnect, the barrier (215) between the etched first dielectric layer (230) and the third layer (210).

Regarding to claims 10, 16, 19, the first dielectric layer (230) and the second dielectric layer (220) is comprised of materials that include silicon and oxygen (see col. 7, lines 34-54, noted that silicon oxide includes silicon and oxygen).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-19 are stand rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. (U.S. Patent No. 6,352,921) in view of Chooi et al. (U.S. Patent No. 6,465,888) as previously applied.

Referring to figures 2a-2f, Han et al. teaches a method of removing a photoresist layer (240) from an integrated circuit (IC) structure having an etched dielectric layer with an exposed barrier layer, wherein the dielectric layer comprises silicon and oxygen (230) and the barrier layer (215), the method comprising:

Feeding a first gas mixture into a reactor wherein the first gas mixture comprises carbon monoxide (CO)(see col. 6, lines 43-60);

Generating a plasma in the reactor (see col. 6, lines 43-60); and

Selectively removing the photoresist layer with little or no etching of the exposed barrier layer (see figure 2C, col. 6, lines 61-67).

Regarding to claim 2, dielectric material is silicon dioxide (see col. 6, lines 54-65).

Regarding to claim 3, the first gas mixture further comprises oxygen (O<sub>2</sub>) (see col. 6, lines 43-60).

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Regarding to claim 4, the first gas mixture further comprises nitrogen ( $N_2$ ) (see col. 6, lines 43-60).

Regarding to claims 5, 11, 15, the first gas mixture further comprise the gas mixture selected from the group consisting of oxygen, nitrogen, nitrogen/oxygen, nitrous oxide, ammonia, nitrogen/hydrogen, and water vapor (see col. 6, lines 43-60).

Regarding to claims 6, 12, 17, etched dielectric material is composed of a material selected from the group consisting of silicon dioxide, silicon oxide, organosilicate glass, and fluorinate silicate glass (see col. 6, lines 14-24).

Regarding to claims 7, 13, 18, cap layer located between the dielectric and the photoresist, the cap layer is composed of a material selected from the group consisting of silicon dioxide, silicon oxynitride, silicon carbide and silicon nitride (235, silicon nitride, see col. 6, lines 36-40).

Regarding to claims 8, 14, reactor used to remove the photoresist from the IC structure is also used to etch the dielectric (see col. 6, lines 61-67).

Regarding to claim 9, a third layer that includes a conductive interconnect (210) that abuts the barrier layer (215) and the second dielectric material (220) adjacent the conductive interconnect, the barrier (215) between the etched first dielectric layer (230) and the third layer (210).

Regarding to claims 10, 16, 19, the first dielectric layer (230) and the second dielectric layer (220) is comprised of materials that include silicon and oxygen (see col. 6, lines 14-42, noted that silicon oxide includes silicon and oxygen).

However, Han et al. does not teach the barrier layer is made of silicon carbide or silicon nitride.

Chooi et al. teaches forming a barrier layer (215, passivation layer) by using a material of silicon carbide (see col. 7, lines 31-34).

Therefore, it would have be obvious to a person of ordinary skill in the requisite art at the time of the invention was made would form the barrier layer by using silicon carbide in process of Han et al. in process of Chooi et al. because the process would prevent the diffusion of the metal layer.

#### ***Response to Arguments***

Applicant's arguments filed 2/15/05 have been fully considered but they are not persuasive.

Applicant contend that none of the prior art teaches of suggested a step of feeding a gas mixture that comprises carbon monoxide (CO) for photoresist removal. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., carbon monoxide (CO) for photoresist removal) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

#### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).



A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Nguyen whose telephone number is (571) 272-1695, or by Email via address Thanh.Nguyen@uspto.gov. The examiner can normally be reached on Monday-Thursday from 6:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached on (571) 272-1702. The fax phone number for this Group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956 (**See MPEP 203.08**).



Thanh Nguyen  
Patent Examiner  
Patent Examining Group 2800

TTN